Original Article

Attributes of cancer patients admitted to the emergency department in one year

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BACKGROUND: Cancer patients frequently visit the emergency department (ED) with various symptoms of cancer. The purpose of this study was to determine the clinical characteristics and 1-year survival rate of cancer patients in the ED of a university hospital.

METHODS: We conducted a retrospective review of 408 cancer patients who visited the ED between January 2011 and December 2011. Patient information on demographics, chief complaints, findings, and survival was gathered from the hospital registry and corresponding health administration.

RESULTS: The study included 240 (58.8%) males and 168 (41.2%) females with a median age of 57.9 years (range 19–87). Regarding cancer staging, 266 patients (65.3%) had metastatic disease and 142 (34.7%) had local and loco-regional disease. The hospitalization rate was 59.6%. The most common symptoms were shortness of breath (23.2%), pain (17.8%), fever (14.2%), and nausea/vomiting (14.4%). The most common cancer sites were the lung (32.5%), gastrointestinal system (25.4%), and breast (9.3%). The initial evaluation determined progressive disease (42.4%), chemotherapy effects (20.7%), infections (17.2%), radiotherapy effects (4.7%), extravasation (1.8%), anemia (1.4%), and unknown (11.3%). During follow up, 191 (46.8%) patients died after admission to the ED. The 1-year overall survival of all patients was 7.3 months.

CONCLUSIONS: Symptom management in cancer patients is a complex multifaceted concern for the emergency physician. Because of the increasing prevalence of cancer patients, emergency physicians should develop consensus algorithms in collaboration with the relevant disciplines to manage the commonly encountered problems.

KEY WORDS: Cancer; Oncology; Emergency department; Survival

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INTRODUCTION

Cancer is the second leading cause of death in the world after cardiovascular disease. With the increase in the size of the elderly population, the number of new cancer cases and treatment-related side effects has increased.[1] The development of new treatment strategies for cancer patients has resulted in a prolonged lifespan and an increased number of visits to emergency departments (EDs) by cancer patients. Most cancer patients experience at least one emergency during the course of their disease.[2]

Some oncologic emergencies are insidious and take months to develop, whereas others manifest over hours, causing devastating outcomes such as paralysis and death.[3] Most oncologic emergencies can be categorized as metabolic (hypercalcemia, syndrome of inappropriate anti-diuretic hormone, tumor lysis syndrome), hematologic (febrile neutropenia), structural (epidural spinal cord

compression, malignant pericardial effusion, superior vena cava syndrome), or side effects from chemotherapeutic agents (diarrhea, extravasations).[4] Early diagnosis and appropriate treatment of cancer patients in the ED are effective in restoring the quality of life. Therefore, emergency services play an important role for this group of patients.

In this study, we aimed to explore the clinical characteristics and 1-year survival of 408 cancer patients admitted to the ED during a 1-year period.

METHODS

Patients

This study was conducted at an ED of a university hospital in southern Turkey. Between January 2011 and December 2011, we searched 54 939 ED admissions of adult patients in the hospital registry for the diagnosis of any solid cancer (including lymphoma) using the International Statistical Classification of Diseases and Related Health Problems (ICD-10) coding system. The local ethical committee approved the study.

We recorded baseline characteristics including age, gender, disease stage, primary system involved, and the number of ED admissions. Cancers were classified based on their primary sites: the lung, breast, gastrointestinal system, genitourinary system, head and neck, gynecological, skin, and soft tissue sarcoma, or the central nervous system. Neuroendocrine cancers with unknown primary sites were also included in the study. The condition necessitating ED admission (the main complaint and the final diagnosis), the number of previous ED admissions, and the immediate outcomes were documented on each admission. The immediate outcomes were reported as hospitalization or discharge from the ED. Survival data were obtained from the hospital registry, health administration, or by telephone survey.

Statistical analysis

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) for Windows (version 11.5; SPSS Inc., Chicago, IL, USA). Descriptive statistics for continuous variables were expressed in the form of mean±standard deviation or median (minimum-maximum). Categorical variables were expressed as the percentage and the number of cases. Factors such as pain, shortness of breath, and stage upon ED admission were evaluated for statistically significant effect on overall survival using the log-rank test with the Kaplan-Meier method. The 3-, 6- and 12-month survival rates for each variable, the average life expectancy and 95% confidence intervals for this period were analyzed (P<0.05).

RESULTS

Among the 54 939 adult patients admitted to the ED during the study period, 424 cancer patients were identified, of whom 408 (96.2%) had oncology-related ED visits. Regarding the 16 patients (3.8%) whose ED visits were not related to their cancer history, the primary reasons for the ED visit were infections (n=8), trauma (n=4), gastroenteritis (n=2), and urticaria (n=2). The mean age of the patients was 57.9±13.3 years. The oncology-related study group consisted of 240 (58.8%) male and 168 (41.2%) female patients. The proportion of patients in the study group with stage IV, III, II, and I disease was 65.3%, 30.7%, 3.5% and 0.5%, respectively. Statistical analysis showed a significant effect of disease stage on overall survival (P<0.001) (Figure 1). Among the patients admitted to the ED, 243 (59.6%) were hospitalized, and 165 (40.4%) were treated as outpatients. The number of ED admissions for each patient during the study period ranged from 1 to 15 (average 2.08). Of the 408 patients, 222 (54.5%) were admitted to the ED once, whereas 186 (45.5%) were admitted twice or more. Demographic and clinical characteristics of the patients are shown in Table 1.

Table 1. Demographic and clinical characteristics of the patients

Characteristics	Results
Age (yr, mean±SD)	57.9±13.3 (19–87)
Gender (n, %)	
Male	240 (58.8)
Female	168 (41.2)
Cancer stage (n, %)	
Stage I	2 (0.5)
Stage II	15 (3.5)
Stage III	125 (30.7)
Stage IV	266 (65.3)
Number of emergency admissions (n, %)	
1	222 (54.5)
>=2	186 (45.5)
Result of ED visits (n, %)	
Hospitalization	243 (59.6)
Discharge from the ED	165 (40.4)
Final diagnosis (n, %)	
Progressive disease	172 (42.4)
Chemotherapy effects	84 (20.7)
Infections	70 (17.2)
Radiotherapy effects	19 (4.7)
Others	59 (14.5)
Mortality (n, %)	
Death during follow-up	191 (46.8)
Alive at end of follow-up	217 (53.2)

SD: standard deviation; ED: emergency department.

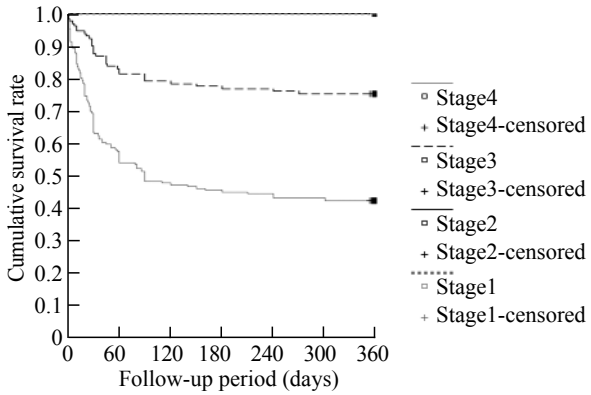

Figure 1. Survival curves according to stage of disease at ED admission.

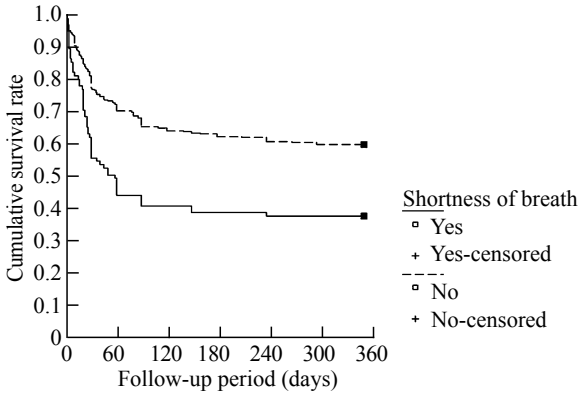

Figure 2. Survival curves for patients presenting with shortness of breath.

Table 2. Localization of malignancies

Site	*n* (%)
Lung	133 (32.5)
Breast	38 (9.3)
Gastrointestinal	
Colon	24 (5.8)
Rectum	17 (4.1)
Gastric	22 (5.3)
Esophagus	7 (1.6)
Cholangiocellular	9 (2.2)
Pancreas	16 (3.9)
Ampulla water	2 (0.4)
Gallbladder	3 (0.7)
Hepatocellular	4 (0.9)
Gynecological	
Ovarian	12 (2.9)
Cervix	15 (3.6)
Uterine	5 (1.2)
Genitourinary	
Bladder	8 (1.9)
Prostate	12 (2.9)
Renal	5 (1.2)
Testicular	2 (0.4)
Lymphoma	30 (7.3)
Head and neck	
Larynx	7 (1.7)
Nasopharynx	8 (1.9)
Tongue	4 (0.9)
Soft tissue and mesothelioma	10 (2.4)
Brain	7 (1.7)
Neuroendocrine	5 (1.2)
Skin	2 (0.4)
Primary unknown	1 (0.2)

Table 2 showed tumors of the patients according to the primary system involved. In patients with oncology-related ED visits, the most common signs and symptoms were shortness of breath (23.2%), pain (17.8%), fever (14.2%), nausea/vomiting (14.4%), confusion (5.8%), and weakness (4.6%). All symptoms and signs were shown in Table 3. Of the 95 patients who presented with shortness of breath, 64 (67.3%) were admitted to the hospital. The median survival time of patients admitted to the ED with shortness of breath was 5.3 months, whereas patients who were not suffering from

Table 3. Symptoms and signs in patients with oncology-related emergency department visits

Symptoms and signs	*n* (%)
Shortness of breath	95 (23.2)
Pain	73 (17.8)
Fever	58 (14.2)
Nausea/Vomiting	59 (14.4)
Confusion	24 (5.8)
Weakness	19 (4.6)
Epilepsy/Hemiplegia	19 (4.6)
Diarrhea/Constipation	17 (4.1)
Icterus	13 (3.1)
Acid	7 (1.7)
Hematochezia	4 (0.9)
Vaginal bleeding	3 (0.7)
Melena	1 (0.2)
Dysphagia	1 (0.2)
Hemoptysis	1 (0.2)
Stomatitis	1 (0.2)

shortness of breath had a median survival time of 7.9 months (P<0.001). Figure 2 depicts the survival curves of patients presenting with shortness of breath.

The 73 patients presenting with pain included 72.6% patients with metastatic disease, 19.1% with loco-regional disease, and 8.3% with local disease. Pain was seen throughout the body parts, including abdominal pain (60.2%), chest pain (10.9%), headache (9.5%), back pain (5.4%), and other pains (14%). The most common causes of abdominal pain were due to metastatic and progressive gastrointestinal cancers such as gastric, colorectal, and pancreatic cancers. All 73 patients whose primary complaint was pain received either narcotics or non-steroidal anti-inflammatory medications. Twenty-three patients with pain were admitted to the hospital. There was no statistically significant difference in the median survival between in-patients with or without pain (P=0.123).

The third most common reason for admission to the ED was fever. Of 58 patients whose primary

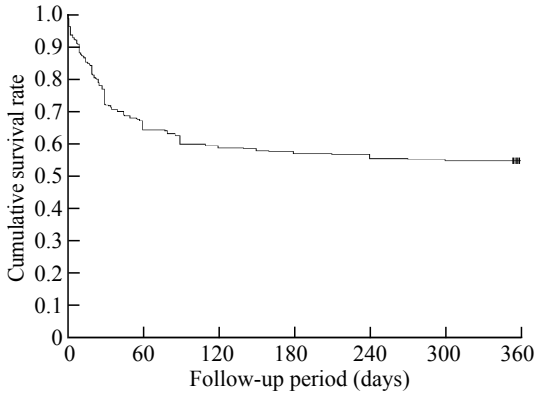

Figure 3. One-year survival in all patients.

complaint in the ED was fever, the most common causes were febrile neutropenia (44.8%), sepsis (25.8%), and pneumonia (13.7%). Fifty of the 58 patients with fever were admitted to the hospital. Seventeen of the patients who were admitted to the hospital because of high fever died within the first 30 days.

One hundred ninety-one patients died during follow-up after admission to the ED. Of these, 117 patients died in the first month, 53 in the first 3 months, and 21 after 3 months. The median survival of the patients who were followed up was 28 days. Among the dead patients, 38.7% had lung cancers, 21.9% had gastrointestinal cancers, 10.4% had gynecologic cancers, 8.3% had genitourinary cancers, and 27.9% had other cancers.

The initial evaluation determined progressive disease (42.4%), chemotherapy effects (20.7%), infections (17.2%), radiotherapy effects (4.7%), extravasation (1.8%), anemia (1.4%), and unknown reasons (11.3 %).

The 1-year survival in stage III patients was 9.6 months, compared with 6 months in stage IV patients (P<0.001). Survival curves of patients according to the disease stage at admission to the ED were shown in Figure 1. One-year overall survival of all patients was 7.3 months. The 1-year median survival for all patients was shown in Figure 3.

DISCUSSION

Cancer continues to be one of the most deadly health problems with increasing significance throughout the world. Based on the GLOBOCAN 2008 estimates, approximately 12.7 million cancer cases and 7.6 million cancer deaths are estimated to have occurred in 2008; of these, 56% of the cases and 64% of the deaths occurred in the developing world.[5] Although cancer is a chronic disease, acute complaints such as pain, shortness of breath, fever, nausea, and vomiting may prompt ED admission. An ED is probably one of the most important places for immediate relief of complaints for the majority of patients with cancer.

In our study, 408 patients had a total of 850 ED visits. The average number of ER visits per patient during the study period was 2.08 (range 1–15). Repeated visits may be due to disease progression or because ED service is often more accessible than outpatient service. A recent survey by the US Centers for Disease Control and Prevention[6] found that 12.5% of all emergency visits resulted in hospital admission. In contrast, over half of the emergency visits by oncology patients resulted in hospital admission.[1,7] Consistent with this, we found 59.6% of the ED visits resulted in hospital admission. These differences in admission rates suggest that the health conditions of oncology patients are more severe than those of typical ED patients. A previous study[1] found the the median time between diagnosis and ED admission to the ED was 4.5 years; however, it was only 7 months (range=0–124) in our study. The time difference between the two studies is primarily due to the more advanced stages of the patients who were admitted to the ED in our study compared with the previous study. Moreover, because diagnostic techniques continuously improve with time, it is likely that the median time between diagnosis and admission to the ED will be reduced every year.

Yucel et al[8] and Swanson et al[1] have both reported that the majority of patients are in later cancer stages upon admission. In our study, 65% of the patients had stage IV, and 30.7% had stage III disease. These data indicate that diagnosis of cancer in an early stage is difficult in our region. The 1-year survival of stage III patients was 9.6 months, compared with 6 months for stage IV patients (P<0.001).

A previous study[9] found that pain, respiratory distress, and fever were the most common symptoms in ED visits, and our results were consistent with this finding. The high prevalence of lung and gastrointestinal cancers among the study population may explain this; 54.7% of the patients admitted to the ED with shortness of breath were diagnosed with lung cancer. In the literature, the median survival of patients admitted to the ED with shortness of breath is short,[10,11] and our results were consistent with this finding (median survival 5.3 months vs.7.9 months in patients admitted with or without shortness of breath, respectively, P<0.001). In addition, shortness of breath was the most common symptom in patients who died during the study period.

The prevalence of pain ranges from 33% in patients after curative treatment to 59% in patients on anticancer treatment and 64% in patients at metastatic, advanced, or terminal stage.[12] Recent studies[13,14] show that different pain was not adequately treated in more than half of patients (range=56%–82%) and that pain was the most common complaint at presentation to the ED.[1,8,15] In our study, pain was the second most common complaint of patients with oncology-related admissions (17.8% of patients). The high incidence of pain among patients with cancer admitted to the ED may be as a result of insufficient supportive care in the outpatient clinics, which could be counteracted through advanced and effective pain management in outpatient clinics. In addition, we demonstrated that most of the patients who were admitted to the ED due to severe pain had metastatic disease (72.6%). Although pain is very common in advanced cancers,[16] there was no statistically significant difference in median survival between patients with or without pain in our study (P=0.123).

Fever and infection are the most significant and life-threatening complications of cancer treatment and very common causes of hospitalization and death.[15,17] Early identification and management of these symptoms is extremely important. Due to the increasing use of chemotherapy regimens in the outpatient setting, emergency physicians have frequently encountered complications secondary to treatment-induced febrile neutropenia. Large studies have demonstrated that neutropenic fever after chemotherapy is the cause of death in 4%–30% of patients.[18–20] The results of our study were similar to those of previous studies.

Studies[8,11,21,22] found that admission to the ED may be an important indicator for poorer survival. In our study, the mortality rate of cancer patients admitted to the ED was 46.8%. Of these patients, 61.2% died within the first month.

In our study, the final diagnosis of cancer patients was predominantly disease progression (42.7%), effect of chemotherapy (20.7%), and infection (17.2%) as reported elsewhere.[8]

Our study is limited by its retrospective nature. In particular, survival data were collected from diverse sources, including telephone surveys, which may influence the reliability of the data.

In conclusion, cancer patients present at the ED with diverse cancer-related symptoms. Thus symptom management of such patients is a complex, multifaceted concern for emergency physicians. In our study, shortness of breath, pain, and fever were the most common symptoms identified in ED visits. And nearly half of the patients admitted to the ED had primary disease progression. Almost half (46.8%) of the patients died during the follow-up after admission to the ED. The results of our study indicate that patients who are admitted to the ED with shortness of breath and advanced stage (stage IV) have a poor survival rate. Because of the high morbidity and mortality, initial evaluation of the patients in the ED and subsequent therapy are of utmost importance to patient outcomes.

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Conflicts of interest: The authors declare that there is no conflict of interest.

Contributors: Sadık M proposed the study, analyzed the data and wrote the first draft. All authors contributed to the design and interpretation of the study and to further drafts.

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